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Modtaget

Deres ref.: -  
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**Protective waistcoat**

**Beskyttelsesvest**

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## Modtaget

The invention relates to a protective waistcoat which comprises a front section on the front side of a person wearing the waistcoat and a back section on the back side of said person, straps for connecting the two sections, and a number of armour  
5 cover parts forming the sections.

Personnel within e.g. the police and the army and also e.g. body guards and doormen can in certain circumstances find themselves in dangerous situations where they risk being  
10 attacked by small arms such as revolvers and small machine guns or by pointed objects such as knives or awls.

When a person in such a situation is wearing a protective waistcoat, the person will to a great extent be secured against  
15 being injured or even killed by the attack.

Such waistcoats are normally made of materials, which are proof against being penetrated by projectiles fired from small arms. Some waistcoats are also made of materials, which are proof  
20 against being penetrated by both a projectile and a pointed object such as a knife or an awl.

The material is conventionally formed as plates, which need to be rather stiff and heavy for being able to offer the person  
25 wearing the waistcoat the wanted satisfactory protection.

While the known protecting waistcoats made of such stiff and heavy armour plates can offer the person the needed protection against attacks of the above named type, the problem of comfort  
30 and the impediments to mobility have been somewhat compromised.

The object of the invention is to provide a protective waistcoat of the type mentioned in the opening paragraph, which is more comfortable for a person to wear than hitherto known.  
35

Another object of the invention is to provide a protective waistcoat of the type mentioned in the opening paragraph, which allows the person wearing the waistcoat, more mobility than hitherto known.

5

A third object of the invention is to provide a protective waistcoat of the type mentioned in the opening paragraph, which is able to offer a person wearing the waistcoat both protection against projectiles fired from small arms and against being  
10 stabbed by a pointed object such as a knife or an awl.

The novel and unique features by means of which this is obtained consists, according to the invention, is the fact that the armour cover parts of the front section comprises at least  
15 one upper plate-formed armour cover part for substantially covering the chest region of a person wearing the waistcoat, at least one lower plate-formed armour cover part for substantially covering the abdominal region of the person, and that at least some of said armour cover parts are arranged in  
20 partly overlapping relationship to each other.

It is important that the cover parts are partly overlapping the adjoining cover parts such that there, in a waistcoat put on a person, are no free openings that allow a bullet or e.g. a  
25 knife or awl to pass and hit the body of the person.

This design impart a person wearing the waistcoat a high degree of comfort and mobility in addition to the high degree of protection against being shot and/or stabbed.  
30

Each armour cover part could appropriately consist of a fabric lining forming an enclosure, which is filled with a protective material.

Such protective material should be proof against at least being penetrated by e.g. low calibre projectiles fired from e.g.  
35

cover parts, which could be connected to the central armour cover part by means of connection webs, which at each side of the central armour cover part are placed between the two armour cover webs on the same side of the central armour cover part as the respective connection webs.

The movements of the skeleton take places by means of motor muscles, which at their ends are attached to the skeleton. The armour cover plates are, according to the invention, placed such that they advantageously cooperate with the different groups of muscles by following the movement of these.

In an expedient embodiment according to the invention, the armour cover plates are arranged such that there at each side of the central armour cover part, is placed an upper plate-formed side armour cover part for substantially covering the scapula region of a person wearing the waistcoat and a lower plate-formed side armour cover part for substantially covering the lower region of the back side of the person, and that at the front side of the person, there are placed two upper plate-formed armour cover parts for substantially covering the chest region, and at least one lower-plate formed armour cover part for substantially covering the abdominal region of the person.

Each armour cover part could appropriately consist of a fabric lining forming an enclosure which is filled with a protective material.

Such protective material should be proof against at least being penetrated by e.g. low calibre projectiles fired from e.g. small arms. A suitable material for this purpose is KEVLAR®, which is manufactured by DuPont. KEVLAR® exists typically in relatively thin plates, which in a number of layers then are sewn together for obtaining the needed thickness.

Bullet-proof materials are, however, not sufficiently proof against being penetrated by a pointed object like a knife or an awl. Between two layers of bullet-proof materials, a second protecting material, which is proof against being penetrated by e.g. a knife or an awl, therefore could be placed. Such material could e.g. be a plate of polycarbonate.

The different armour cover parts are, according to the invention, connected with straps allowing the cover parts to move in relation to each other in such a way that the cover plates advantageously will follow the movements of the skeleton and the musculature of the person wearing the waistcoat.

For that purpose the straps for interconnecting the front section and the back section therefore can have a first set of straps extending over the shoulders of a person wearing the waistcoat and connecting the upper plate-formed side armour cover parts for substantially covering the scapula region of the person and the at least one upper plate-formed armour cover part for substantially covering the chest region of the person.

Furthermore, the first set of straps can be connected to the upper end of the elongated central armour cover part extending along the spinal column of a person wearing the waistcoat by means of a second set of straps, and the lower end of the central armour cover part can be connected to the at least one upper plate-formed armour cover part for substantially covering the chest region of the person by means of a third set of straps.

When at least some of the straps are made of an elastic material, the possibility and ability of the armour cover parts to move in relation to each other and to follow the movements of the skeleton and the musculature of the person wearing the waistcoat will improve.



Due to the design the weight of the waistcoat is distributed over the entire body of the wearer. Consequently, the waistcoat does not feel heavy to wear.

- 5 The invention will be explained more fully by the following description of an embodiment, which just serves as an example, with reference to the drawings, in which
- 

10 Fig. 1 is a front view of a person wearing a waistcoat according to the invention,

Fig. 2 shows the same, seen from the side,

15 Fig. 3 shows the same, seen from behind,

Fig. 4 shows, on an enlarged scale, the waistcoat, seen from the front,

20 Fig. 5 shows the same, seen from behind,

Fig. 6 is an exploded view of a back section of the waistcoat,

25 Fig. 7 is a perspective view of a fragment of an elongated central armour cover part of the back section,

Fig. 8 shows a fragment, seen from the side, of the lower end of a front section of the waistcoat, and

30 Fig. 9 shows on an enlarged scale, seen in section, a detail of the lower end of the front section of the waistcoat.

In figs. 1 - 3 is seen a person 1 wearing a waistcoat 2 according to the invention. The waistcoat serves to protect the person against being wounded by low calibre projectiles fired from small arms such as revolvers and small machine guns and/or being stabbed by a pointed object such as a knife or an awl.

The waistcoat consists of a front section 3, as seen in fig. 1, and a back section 4, as seen in fig. 3. Fig. 2 shows that the two sections 3 and 4 are partly overlapping each other along the side of the person thereby carefully protecting also this part of the person. Shoulder straps 5a,5b, extending over the shoulders of the person, are connecting the two sections 3 and 4.

Figs. 4 and 5 show, on an enlarged scale, solely the waistcoat 2, which in fig. 4 is seen from the front and in fig. 5 from behind. The two sections 3 and 4 are built up of several armour cover parts, the construction of which will be more fully explained later on.

The cover parts of the back section 4 consist of an elongated central cover part 6 extending along the spinal column of the person 1, two upper plate-formed side cover parts 7a,b and two lower plate-formed side cover parts 8a,b.

The back section of the waistcoat is in fig. 6 seen in an exploded view, and the central cover part 6 is, in perspective, shown in fig. 7.

As best seen in fig. 7, the central cover part 6 has at each side of a central axis 9 two armour cover webs 10 and two connection webs 11 which are placed between two of said armour cover webs 10.

Each of the upper plate-formed side cover parts 7a,b are assembled with one of the connection webs 11 by means of a zipper 12, and each of the lower plate formed side cover parts 8a,b are assembled with another one of the connection webs by means of a zipper 13.

When attached to the connection webs 11, the armour cover webs 10 are partly overlapping the cover parts 7a,b and 8a,b, and these are again partly overlapping each other.

- 5 Two straps 14a,b are attached to the top of the two upper side cover parts 7a,b for connecting said parts to the front section ~~via the shoulder straps 5a,b extending over the shoulders of~~ the person wearing the waistcoat. Buckles 15a,b serve for making the connections adjustable.

10

The cover parts of the front section 5 consist of two upper plate-formed cover parts 16a,b and a first 17 and second 18 lower plate-formed cover part. The upper cover parts 16a,b are in this case detachably assembled by means of a zipper 19 in

- 15 partly overlapping relationships to each other.

- The first lower cover part 17 is connected to the upper plate-formed cover parts 16a,b in partly overlapping relationships to this by means of straps 20a,b attached to the upper end of the
- 20 upper cover parts 16a,b. The straps are preferably made of an elastically material such as neoprene.

- The second lower cover part 18 is connected to the upper plate formed cover parts 16a,b in partly overlapping relationships to
- 25 the first lower cover part 17 by means of straps 21a,b attached to the lower end of the upper cover parts 16a,b. The straps 21a,b are preferably made of an elastically material such as neoprene.

- 30 Furthermore, there can be provided one or more straps, for connecting either the lower end of the first lower plate formed cover part 17 of front section 3 or the lower end of the second lower plate formed cover part 18 of front section 3 to the belt straps of the trousers (not shown) of the person wearing the
- 35 waistcoat. Optionally a corresponding arrangement can be made in relation to the back section 4.

Straps 22a,b having buckles 23a,b attached to the lower end of the upper cover parts 16a,b serve to connect these to the belt straps of the trousers (not shown) of the person wearing the waistcoat.

When putting on the waistcoat, the shoulder straps 5a,b, which connect the front and back sections 3 and 4 of the waistcoat 2, are laid over the shoulders of the person who is to wear the waistcoat, such that the front section is hanging down the front of the person and the back section is hanging down the back of the person.

The two sections 3 and 4 are brought into correct position in relation to the body of the person and to each other by adjusting the shoulder straps 5a,b in relation to the upper cover parts 16a,b. This adjusting can be done easily and quickly because the upper cover parts 16a,b and the shoulder straps 5a,b are supplied with mating strips of VELCRO® 24a,b.

Then the two sections 3 and 4 are tightened in relation to the body of the person and in relation to each other by means of several straps.

Two pair of straps 25a,b, attached to each side of the lower end of the central cover part 6 of the back section 4, are pulled through loops 26a,b on the lower plate-formed side cover parts 8a,b of the back section 4 and through another loop 27 on the second lower plate-formed cover part 18 of the front region 3.

Then the two pair of straps 25a,b are tightened in relation to each other by means of buckles 28 on one of the two pair of straps 25a,b. The lower plate-formed side cover part 8a,b of the back section 4 and the second lower plate-formed cover part

18 of the front region 3 are thereby partly folded over the side regions of the body of the person 1 in partly overlapping relationships to each other while in the same time said parts appropriately are gathered about the body.

5

Further, two other straps 29a,b, attached to each side of the lower end of the central cover part 6 of the back section 4, are pulled through loops 30a,b on the lower plate-formed side cover parts 8a,b of the back section 4 and fastened to the lower end of the upper plate-formed cover part 16a,b of the front section 3, thereby appropriately gathering the lower plate formed side cover parts 8a,b, the first lower plate-formed cover part 17 of the front region 3 and the upper plate-formed cover parts 16a,b of the front section 3 about the body of the person.

At the same time the first cover part 17 is brought into partly overlapping relationships to the lower plate-formed side cover parts 8a,b of the back section 4 and into the upper plate-formed cover parts 16a,b of the front section 3. The first cover part 17 has also been partly folded around the side region of the body of the person.

Two straps 31a,b attached to each side of the upper end of the elongated central cover part 6 of the back section 4 are moreover pulled through the buckles 15a,b on the straps 14a,b on top of the upper side cover parts 7a,b for centralising the back section correctly in relation to the body of the person.

This operation can be done easily and quickly because the straps 31a,b are supplied with strips 32a,b of VELCRO®.

Also the upper cover parts 16a,b of the front section 2 of the waistcoat are attached to the belt straps of the person's trousers (not shown) by means of the straps 22a,b with the buckles 23a,b.

Now the waistcoat is carefully secured to the body of the person and in such a way that the armour cover parts are partly overlapping the adjoining cover parts, thereby leaving no opening free for allowing a bullet or a knife or awl to find its way to the body of the person.

This advantageous construction is illustrated in fig. 8 showing a fragment, seen in section, of the lower end of the front section 2. The upper plate-formed cover part 16a,b of the front section 2 is, as can be seen, connected to the second lower plate-formed cover part 18 of the front region 2 with the straps 21a,b leaving an opening 33 free between said parts. Said opening is, however, covered by the first lower plate-formed cover part 17.

Fig. 9 shows, on an enlarged scale and seen in section, a detail of the two lower cover parts 17 and 18 illustrating how the armour cover parts more precisely are constructed.

Each armour cover part consists of a fabric lining in form of an enclosure 34. In the enclosure is placed a first protecting material 35, which is proof against being penetrated by e.g. low calibre projectiles fired from e.g. small arms.

The first protecting material could be KEVLAR®, a material that is manufactured of Du Pont in relatively thin sheets, which are sewn together for obtaining the necessary thickness.

Many bullet-proof materials are, however, not sufficiently proof against being penetrated by a pointed object such as a knife or an awl. To overcome this problem there is between two layers of the first protecting material 35 in each enclosure placed a second protecting material 36 which is proof against being penetrated by e.g. a knife or an awl. The second

protecting material 36 could typically be a plate of a hard plastic such as polycarbonate.

As it appears from the explanation above, the armour cover parts each correspond to a specific region of the body of the person wearing the waistcoat. Moreover, the straps connecting the armour cover parts are to a great extent arranged along the motor muscles and also have such an elasticity that each armour cover part follows the movement of the corresponding region of the body.

The waistcoat according to the invention therefore obtains the same pattern of movement as the body of the person wearing the waistcoat, thereby offering the person much more freedom of movement and much more comfort than what is possible when using a protective waistcoat of conventional type.

More specifically, the upper armour cover parts 16a,b of the front section 2 covering the chest sit tightly to follow the body movement, while the lower armour cover parts 17 and 18 of the front section 2 slide over each other like tiles for no impediments to body movement or downward rotation of body.

The lowermost armour cover part 18 is fastened to the belt straps on the person's trousers (not shown) ensuring that it remains in position when moving away from a potential attacker forcing the person backwards.

The upper plate-formed side cover parts 7a,b of the back section 3 are constructed to slide, stretch from the connections and fall back into place depending on how the body moves, and the lower plate-formed cover parts 8a,b overlaps the abdominal region.

The waistcoat according to the invention provides the wearer with a great mobility. The waistcoat enables the wearer to sit,

to get in and out of e.g. a car, without the protective parts of the waistcoat being moved out of the protective position. The waistcoat fits tightly over the human body and will due to its structure always adapt to the different movements of the person. E.g. a person raising his arms to a shooting position will still be protected as the cover plates during the movement ~~of the arms slide above each other. The known rigid protective~~ waistcoats will be raised together with the arms thereby providing an unpractical shooting position and in addition to this leave a part of the human body free.

The embodiment described above and shown in the figures is only to be understood as an example of the invention. Within the scope of the invention there could therefore be many other embodiments. As an example can be mentioned that the waistcoat can be made with the front according to the invention and a traditional back.

The front section of the waistcoat could, by way of example, thus be formed like the back section with an elongated central cover part and plate-formed side cover parts attached to the central cover part.

Furthermore, each of the cover parts can be removed and washed individually if they were to get soiled by e.g. blood.



## Claims

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1. A protective waistcoat comprising:
  - 5 - a front section (3) on the front side of a person (1) wearing the waistcoat (2) and a back section (4) on the ~~back side of said person,~~
  - straps (5a,b;14a,b;20a,b;21a,b;25a,b;29a,b;31a,b) for connecting the two sections (2;3), and
  - 10 - a number of armour cover parts (6;7a,b;8a,b;16a,b;17;18) forming the sections, characterised in that the armour cover parts (6;7a,b;8a,b) of the back section (4) are comprising:
    - an elongated central armour cover part (6) extending along  
15 the spinal column of a person wearing the waistcoat (2), and
    - at least two plate-formed side armour cover parts (7a,b;8a,b) attached on each side of the central armour cover part (6) in partly overlapping relationship to this  
20 and to each other.
2. A protective waistcoat according to claim 1, characterised in that the central armour cover part (6) comprises:
  - 25 - at least two webs (10) extending in opposite directions and connecting the at least two plate-formed side armour cover parts (7a,b;8a,b) on each side of the central armour cover part (6), and
  - at least two armour cover webs (11) extending in opposite directions and partly overlapping the at least two plate-formed side armour cover parts (7a,b;8a,b) connected to  
30 the respective connection web (10).
3. A protective waistcoat according to claim 2, characterised in that the central armour cover part (6) comprises:
  - 35 - two armour cover webs (10) on each side of the central armour cover part (6), and

- two connection webs (11) on each side of the central armour cover part (6) arranged between the two armour cover webs placed on the same side of the central armour cover part (6) as the respective connection webs (11).

5

4. A protective waistcoat according to claim 2 or 3, ~~characterised in that there on each side of the central~~ armour cover part (6) is arranged an upper plate-formed side armour cover part (7a,b) for substantially covering the scapula region of a person wearing the waistcoat (2) and a lower plate-formed side armour cover part (8a,b) for substantially covering the lower region of the back of the person.

- 15 5. A protective waistcoat according to each of the claims 1 - 4, ~~characterised in that that the~~ armour cover parts (16a,b;17;18) of the front section (3) are comprising:
- at least one upper plate-formed armour cover part (16a,b) for substantially covering the chest region of a person wearing the waistcoat (2), and
  - 20 - at least one lower plate-formed armour cover part (17;18) for substantially covering the abdominal region of the person.

- 25 6. A protective waistcoat according to each of the claims 1 - 5, ~~characterised in that each~~ armour cover part (6;7a,b;8a,b;16a,b;17;18) is comprising:
- a fabric lining forming an enclosure (34), and
  - a first protecting material (35), which is held in said enclosure (34) and is proof against being penetrated by
  - 30 e.g. low calibre projectiles fired from e.g. small arms.

7. A protective waistcoat according to claim 6, ~~characterised~~ in that the first protecting material (35) in each enclosure (34) consists of a number of layers sewn together.
- 35

8. A protective waistcoat according to claim 7, characterised in that there between two layers of the first protecting material (35) in each enclosure is placed at least one second protecting material (36) which is proof against being penetrated by e.g. a knife or an awl.
- 
9. A protective waistcoat according to each of the claims 1 - 8, characterised in that the straps (5a,b;14a,b;20a,b; 21a,b;25a,b;29a,b;31a,b) for connecting the front section (3) and the back section (4) of the waistcoat (2) are comprising a first set of straps (5a,b) extending over the shoulders of a person wearing the waistcoat and connecting the upper plate-formed side armour cover parts (7a,b) for substantially covering the scapula region of the person with the at least one upper plate-formed armour cover part (16a,b) for substantially covering the chest region of the person.
10. A protective waistcoat according to claim 9, characterised in that
- the first set of straps (5a,b) is connected to the upper end of the elongated central armour cover part (6) extending along the spinal column of a person wearing the waistcoat (2) by means of a second set of straps (31a,b), and
  - the lower end of the central armour cover part (6) is connected with the at least one upper plate-formed armour cover part (16a,b) for substantially covering the chest region of the person by means of a third set of straps (29a,b).
11. A protective waistcoat according to claim 9, characterised in, that at least some of the straps are made of an elastic material.

**Protective Waistcoat****ABSTRACT**

5 A protective waistcoat is comprising a front section (3) on the front side of a person (1) wearing the waistcoat (2) and a back section (4) on the back side of said person. Straps (5a,b;14a,b;20a,b;21a,b;25a,b;29a,b;31a,b) for connecting the two sections (2;3), and a number of armour cover parts (6;7a,b;8a,b;16a,b;17;18) forming the sections. The armour cover parts (6;7a,b;8a,b) of the back section (4) are comprising an elongated central armour cover part (6) extending along the spinal column of a person wearing the waistcoat (2), and at least two plate formed side armour cover parts (7a,b;8a,b) attached at each side of the central armour cover part (6) in partly overlapping relationship to this and to each other. The waistcoat according to the invention thereby is offering the person much more freedom of movement and much more comfort than possible when using a protective waistcoat of conventional type.

Fig. 2

Beskyttelsesvest

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SAMMENDRAG

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- 5 En beskyttelsesvest omfatter en frontsektion (3) på forsiden af den person (1), der bærer vesten (2), og en rygsektion (4) på ryggen af nævnte person, remme (5a,b;14a,b;21a,b;25a,b;29a,b;31a,b) til at forbinde sektionerne (2;3), og et antal panserdækdele (6;7a,b;8a,b;16a,b;17;18), der danner
- 10 sektionerne. Rygsektionens (4) panserdækdele (6;7a,b;8a,b) omfatter en langstrakt midterpanserdækdæl (6), der strækker sig langs rygraden af den person (1), der bærer vesten (2), og i det mindste to pladeformede sidepanserdækdele (7a,b;8a,b) fastgjort på hver side af midterpanserdækdelen (6) i delvis
- 15 overlappende relation til denne og til hinanden. Vesten ifølge opfindelsen yder dermed personen meget mere bevægelsesfrihed og meget bedre komfort end en konventionel beskyttelsesvest.

Fig. 2

20

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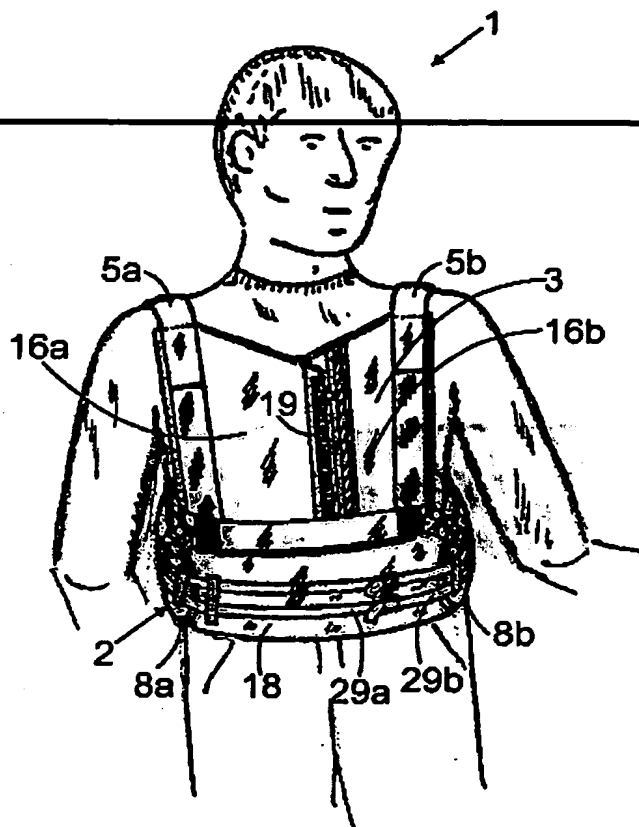


FIG 1

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FIG. 3

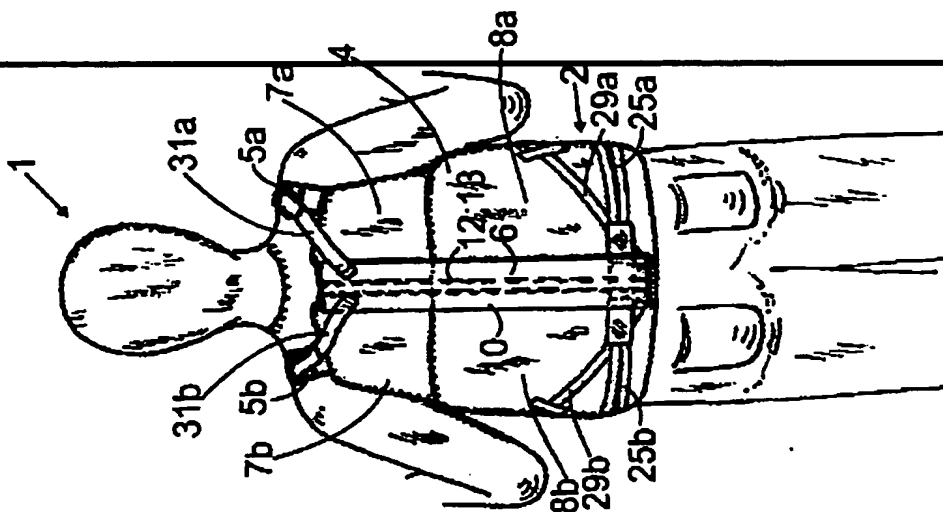
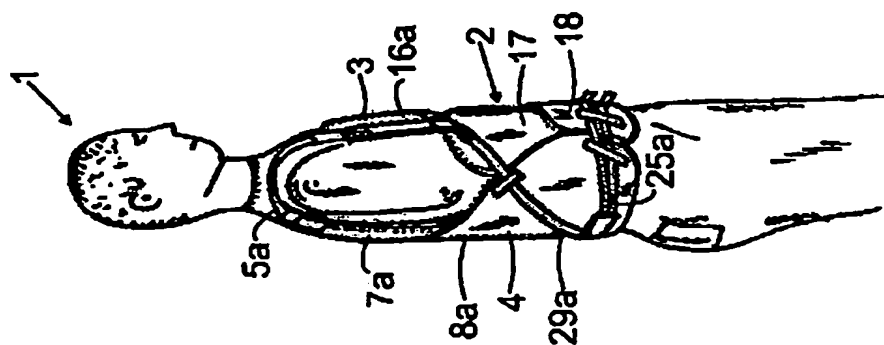


FIG. 2



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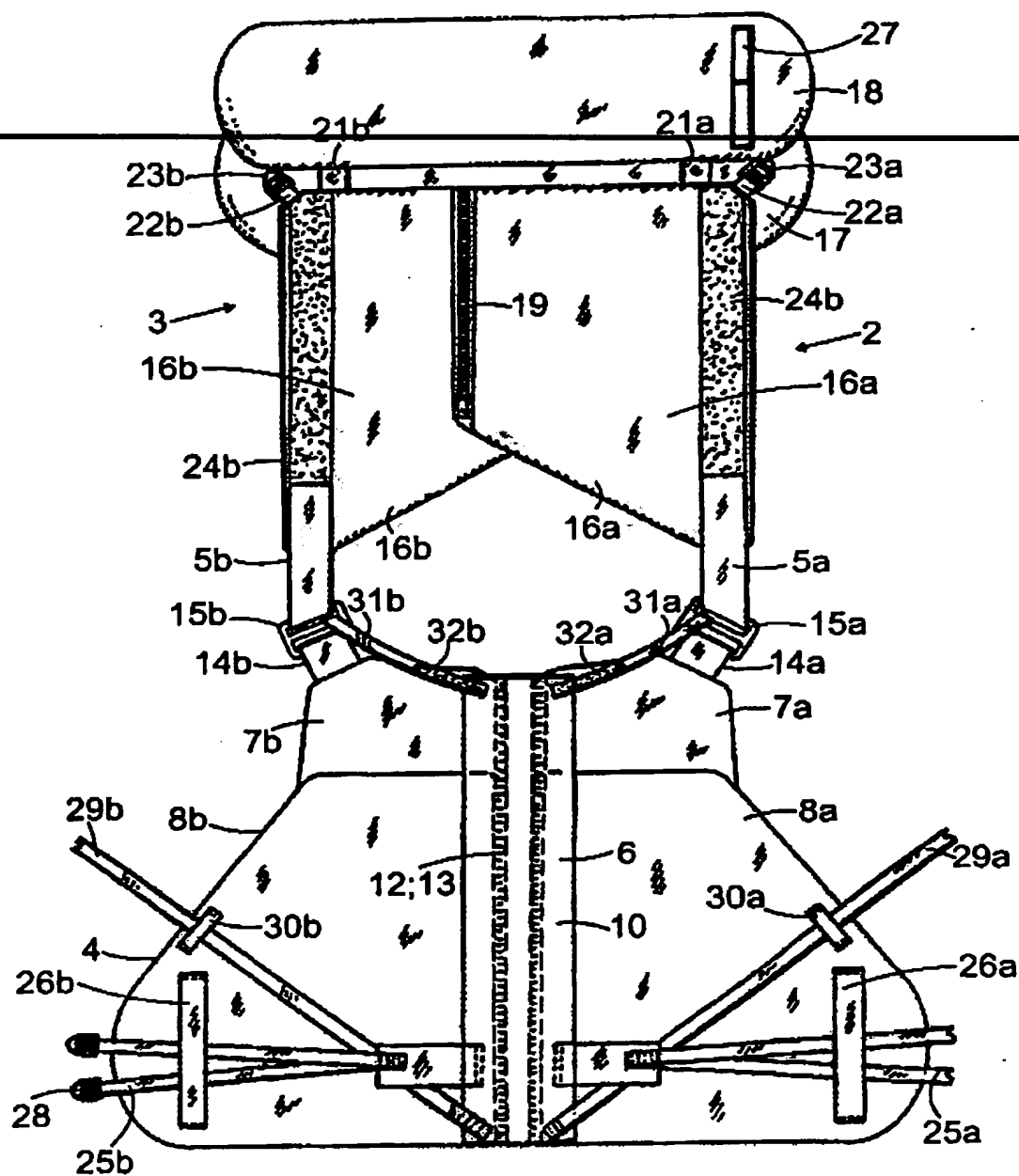


FIG. 4

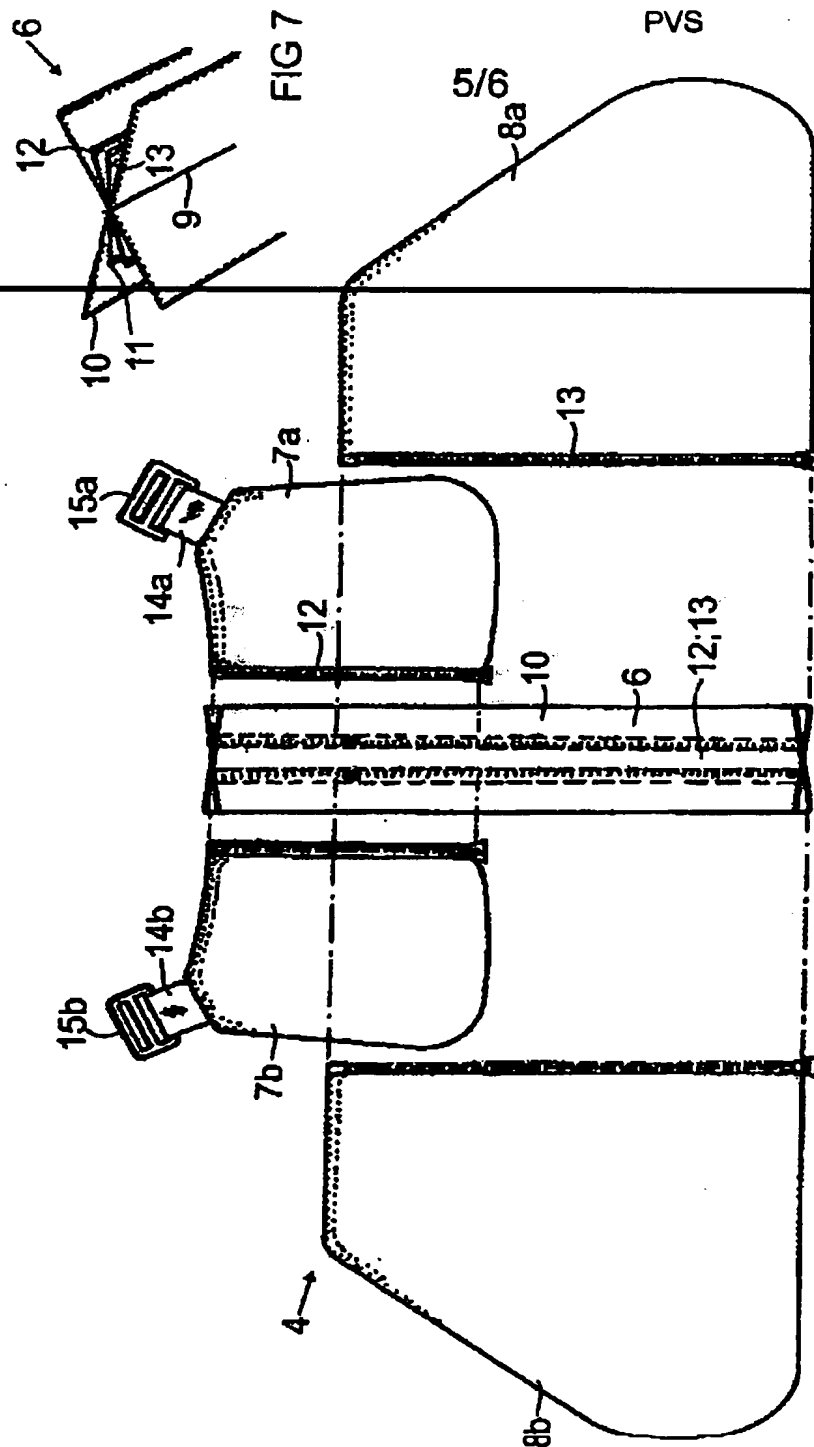




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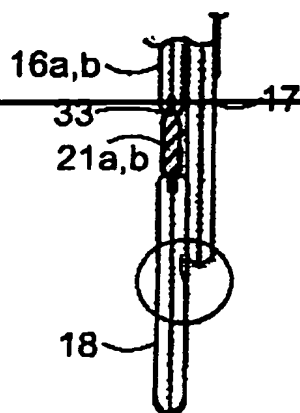


FIG. 8

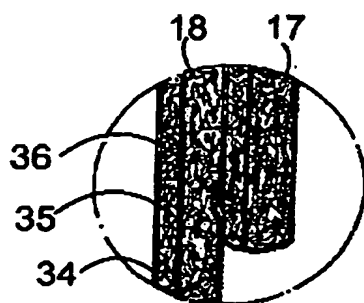


FIG. 9

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